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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/766,105	01/28/2004	Daniel Roy Solli	9450	2184

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EXAMINER	
CHOI, WILLIAM C	

ART UNIT	PAPER NUMBER
2873	

DATE MAILED: 07/25/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/766,105	SOLLI, DANIEL ROY	
	Examiner	Art Unit	
	William C. Choi	2873	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *13 June 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-8,11 and 13-15* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-8 and 13-15* is/are rejected.

7)☒ Claim(s) *11* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *28 January 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Allowable Subject Matter

The indicated allowability of claims 1-7 and 13-15 are withdrawn in view of the newly discovered reference(s) to Lin et al (U.S. 2001/0012149 A1). Rejections based on the newly cited reference(s) follow.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 5 and 7 are is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 5 recites the limitation " wherein **that** portion of said beam having **said first wavelength**" in lines 1 and 2. There is insufficient antecedent basis for this limitation in the claim. For purposes of examination, it was assumed applicant meant, "wherein **a** portion of said beam having **a** first wavelength".

Claim 7 recites the limitation " wherein **said transmitted beam**" in line 1. There is insufficient antecedent basis for this limitation in the claim. For purposes of examination, it was assumed applicant meant, "wherein **a** transmitted beam".

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-7 and 13-15 are rejected under 35 U.S.C. 102(b) as being anticipated by Lin et al.

In regard to claim 1, Lin et al discloses an apparatus for controlling the polarization of an incident beam of electromagnetic radiation (page 8, section [0115], Figure 12b) comprising: photonic crystal means (page 8, section [0115], line 5, Figure 12b, "1206"), and means for directing said incident beam of electromagnetic radiation at said photonic crystal means (Figure 12b, "1204"), wherein said photonic crystal means comprises a crystalline lattice having cells with a defined periodic geometry (Figure 12b, "1206") that produces a polarization-dependent band structure by interference between Bragg reflections from many material interfaces for electromagnetic radiation (page 1, section [0003]).

Regarding claims 2 and 3, Lin et al discloses wherein said beam propagates in the plane of periodicity of a two-dimensional or three-dimensional photonic crystal (page 1, section [0012], lines 4-5).

Regarding claim 4, Lin et al discloses wherein said beam is a polarized beam of EM radiation (page 8, section [0115], lines 6-8, Figure 12b, "1204") and wherein said photonic crystal means includes a transparent spectral region at a lower frequency than

the fundamental band gap or between two band gaps (page 5, section [0080]), and that portion of said beam in said transparent spectral region is transmitted through the crystal and the polarization of said transmitted beam is altered by said photonic crystal means, whereby said crystal functions as a waveplate (page 8, section [0115], lines 8-20).

Regarding claim 5, Lin et al discloses wherein a portion of said beam having a first wavelength is exponentially attenuated by said photonic crystal means and is reflected so that said apparatus functions as a reflection waveplate (page 1, sections [0006]-[0008] and page 5, section [0082], lines12-15, Figure 6c).

Regarding claim 6, the incident EM radiation beam of Lin et al would inherently include first and second polarization components, and wherein said photonic crystal means would inherently reflect said first polarization component and transmit said second polarization component, functioning as a polarizer, this being reasonably assumed from Lin et al disclosing a beamsplitter (page 5, section [0082], lines12-15, Figure 6c).

Regarding claim 7, a transmitted and reflected beam could inherently have any angle relative to said incident beam, whereby said apparatus is not limited by Brewster's angle, this being reasonably assumed from Lin et al disclosing it wherein said apparatus is a photonic crystal (page 5, section [0082], lines 5-7).

In regard to claim 13, Lin et al discloses an optical apparatus for selectively changing a first known polarization of an input beam to a second, predetermined polarization of an output beam (page 8, section [0115], lines 8-19), comprising: a

photonic crystal means (page 8, section [0115], line 5, Figure 12b, "1206"), and means for directing said input beam at said photonic crystal means (Figure 12b, "1204"), wherein said photonic crystal means comprises a crystalline lattice having cells with a defined periodic geometry (Figure 12b, "1206") that produces a band structure by interference between Bragg reflections from many material interfaces for electromagnetic waves (page 1, section [0003]).

In regard to claim 14, Lin et al discloses a method of converting the polarization of an incoming beam of light from a first, known polarization to a second, selected polarization (page 8, section [0115], Figure 12b), comprising the steps: directing said incoming beam of light along a predetermined path (page 8, section [0115], lines 5-7, Figure 12b, "1204"), causing said incoming beam to enter a photonic crystal (page 8, section [0115], lines 8-9, Figure 12b, "1204, 1206") wherein said photonic crystal is adapted to convert said first polarization to said second polarization (page 8, section [0115], lines 8-19), and causing said second selected polarization to be transmitted through said photonic crystal (page 8, section [0115], lines 18-19, Figure 12b, "1205").

In regard to claim 15, Lin et al discloses an optical apparatus for creating a delay line arising from a transfer of energy between two different polarizations of electromagnetic (EM) waves (page 8, section [0115], lines 8-20, Figure 12b), comprising birefringent crystal means (page 8, section [0115], line 5, Figure 12b, "1206") and would inherently comprise polarizer means in series with said birefringent crystal means and means for directing said EM wave through said birefringent crystal and polarizer means, this being reasonably assumed from Lin et al disclosing wherein

the input light is polarized (page 8, section [0115], lines 7-8) and input beam ("1204") directed at the birefringent crystal ("1206") in Figure 12b and would also inherently have a delayed or advanced transmitted electromagnetic waveform resulting by adjusting said incident EM wave polarization, this being reasonably assumed from Lin et al disclosing wherein said apparatus is a retarder (page 8, section [0115], lines 13-17).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lin et al.

In regard to claim 8, Lin et al discloses an apparatus comprising birefringent photonic crystal means composed of material with optical nonlinearity (page 4 & 5, sections [0076]-[0081], Figure 5), but does not specifically disclose wherein said apparatus is for maximizing conversion efficiency in nonlinear optical mixing processes between incoming and outgoing polarized optical beams and wherein said birefringent photonic crystal means is composed of said material for achieving phase matching of said output beams with said incoming beams, is adapted to reduce the wavevector mismatch Δk between said incoming and output beams to zero using said photonic crystal birefringence and is adapted to achieve phase matching with minimal use or angle or temperature tuning. However, it has been held in recitation that the intended

use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made for the apparatus of Lin et al to be used for maximizing conversion efficiency as claimed, since the prior art structure is capable of performing the intended use.

Allowable Subject Matter

Claim 11 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter: The prior art fails to teach a combination of all the claimed features as presented in claim 11: an apparatus for maximizing conversion efficiency comprising birefringent photonic crystal means as claimed, specifically wherein said photonic crystal means is composed of material which is not naturally birefringent.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to William C. Choi whose telephone number is (571) 272-2324. The examiner can normally be reached on Monday-Friday from about 9:00 am to 6 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Georgia Y. Epps can be reached on (571) 272-2328. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

W.C.

William Choi
Patent Examiner
Art Unit 2873
July 20, 2005

Georgia Epps
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